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10/597,200	07/14/2006	Jong-Lam Lee	P2381US00	7656
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H.C. PARK & ASSOCIATES, PLC			EXAMINER	
8500 LEESBURG PIKE			NGUYEN, THINH T	
SUITE 7500				
VIENNA, VA 22182			ART UNIT	PAPER NUMBER
			2818	
			NOTIFICATION DATE	DELIVERY MODE
			02/25/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATENT@PARK-LAW.COM

Office Action Summary

Application No.

10/597,200

Applicant(s)

LEE, JONG-LAM

Examiner

THINH T. NGUYEN

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 12-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-7 and 12-17 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This is in response to Applicant's Amendment filed January/ 26th /2010.

Note that the figures and reference numbers referred to in this Office Action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

2. Claims 1-7, 12-17 are pending in the Application.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, -- **"the second layer"** --in claim 12-17 or **"the third layer"** in claim 12-16 or "the **contact metal layer** is disposed directly on the gallium nitride-based semiconductor layer and **comprises a Ni layer, an Ir layer, and a Pt layer**" -- in claim 17 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of

the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The Examiner note that this Application has some claim with limitation of intended use of a structure for example **diffusion barrier** layer, or a limitation in the preamble .Please note that it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus (explicitly disclosed or not) satisfying the claimed structural limitations. *Ex Parte Masham*, 2 USPQ F.2d 1647 (1987). Moreover, please also note that a preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in--

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

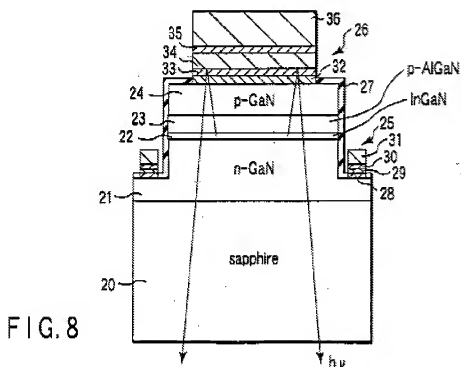
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

6. Claims 1-6 are rejected under 35 U.S.C. §102(b) as being anticipated by Okazaki et al.(US patent Application publication 2002/0014630) thereafter Okazaki 630. .

Note that although the Examiner quote different part of the reference, Applicant please go over the entire reference as a whole where other evidences can be found as well.

With regard to claim 1, Okazaki 630. discloses (the abstract, fig 8) a gallium nitride-based III-V group compound semiconductor device comprising (for the P-side electrode in fig 8) :a gallium nitride-based semiconductor layer(fig 8 layer 24) ; a p-type ohmic electrode layer formed on the gallium nitride-based semiconductor layer,wherein the p-type ohmic electrode layer comprises a contact metal layer (layer 32 or 33 fig 8, or combined layer 32 and 33, paragraph [0097]), a reflective metal layer(fig 8 layer 34, the abstract, paragraph

[0097], paragraph [0098]) and a diffusion barrier layer (fig 8, layer 35, the abstract, paragraph [0098]), the reflective metal layer (fig 8 layer 34) being disposed between the contact metal layer (fig 8 layer 32 or 33 or combined layer 32+33) and the diffusion barrier layer (fig 8 layer 35, paragraph [0097], [0098])



With regard to claim 2, Okazaki 630 discloses a Gallium Nitride device wherein the p-type ohmic electrode layer further comprises at least one bonding metal layer (fig 8, the abstract , paragraph [0097]). for the P-side electrode (layer 36, fig 8, paragraph [0097], paragraph [0098]).

With regard to claim 3, Okazaki 630 discloses a Gallium Nitride device (fig 8 layer 28, layer 29 , layer 30 , and layer 31, paragraph [0097]), wherein the p-type ohmic electrode layer is formed by sequentially laminating the contact metal layer (fig 8, combined layer 32+33) the reflective metal layer,(fig 8 layer 34) the diffusion barrier layer (fig 8 layer 35) , and the bonding metal layer fig 8 layer 36)

With regard to claim 4, Okazaki 630 discloses a Gallium Nitride device wherein the contact metal layer comprises at least one of Ni, Ir, Pt, Pd, Au, Ti, Ru, W, Ta, V, Co, Os, Re, and Rh.

Note that Okazaki 630 discloses that the contact metal layer 32 is made of Ni (fig 8, layer 32,the abstract, paragraph[0097]) .

With regard to claim 5, Okazaki 630 discloses a Gallium Nitride device wherein the reflective metal layer comprises at least one of Al and Ag (fig 8 , layer 34 , paragraph [0097],[0098]) note that Okazaki 630 discloses that layer 34 is made of Aluminum..

With regard to claim 6, Okazaki 630 discloses a Gallium Nitride device wherein the diffusion barrier layer comprises at least one of Ru, Ir, Re, Rh, Os, V, Ta, W, ITO (Indium Tin Oxide), IZO (Indium Zinc oxide), RuO₂, VO₂, MgO, IrO₂, ReO₂, RhO₂, OsO₂, Ta₂O₃, and WO₂ (paragraph [0134]). Note Okazaki 630 discloses the use of tungsten (W) and Vanadium (V) as barrier layer (paragraph [0134]).

With regard to claim 12, Okazaki 630 discloses (fig 8 ,the abstract) the invention of a gallium nitride-based III-V group compound semiconductor device wherein the contact metal layer comprises a first layer and a second layer (1st contact layer 32 and 33, fig 8, paragraph [0097][0098],[0134]), and wherein the first layer (fig 8 layer 32 paragraph

[0097][0098],[0134]),) comprises one of Ni, Ir, Pt, Pd, Au, Ti, Ru, W, Ta, V, Co, Os, Re, and Rh, the second layer (fig 8 layer 33 paragraph [0097][0098],[0134]), comprises one of Ni, Ir, Pt, Pd, Au, Ti, Ru, W, Ta, V, Co, Os, Re, and Rh, and the first layer and the second layer do not comprise the same material.

With regard to claim 13, Okazaki 630 discloses (fig 8 ,the abstract) the invention of a gallium nitride-based III-V group compound semiconductor device wherein the ohmic electrode layer further comprises at least one bonding metal layer (fig 8 ,layer 36) disposed on the diffusion barrier layer(fig 8 layer 35), the diffusion barrier layer (fig 8 layer 35) being disposed between the reflective layer (fig 8 layer 34) and the at least one bonding metal layer (fig 8 layer 36).

7. Claims 1- 7 are rejected under 35 U.S.C. §102(b/e) as being anticipated by Slater Jr et al. al. (US patent Application publication 2003/0015721) thereafter Slater 721.

Note that the Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

With regard to claim 1, Slater 721 discloses (the abstract, fig 8,fig 7) a gallium nitride-based III-V group compound semiconductor device comprising; a p-type ohmic electrode layer (paragraph [0022] , Slater 721 discloses that all of his embodiments are complementary ; i.e. include p-type or n-type) formed on the gallium nitride-based semiconductor layer(fig 7,fig 8, layer 30) wherein the p-type ohmic electrode layer comprises a contact metal layer (layer 32 fig 8, fig 7) a reflective metal layer(fig 8,fig 7 layer 34, the abstract, paragraph [[0041]and a

diffusion barrier layer.(fig 8, fig 7 layer 36, the abstract, paragraph [0041], the reflective metal layer (fig 8 layer 34) being disposed between the contact metal layer (fig 8,fig 7) layer 32) and the diffusion barrier layer (fig 8 layer 36)

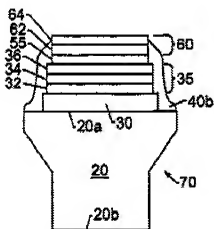


FIG. 7.

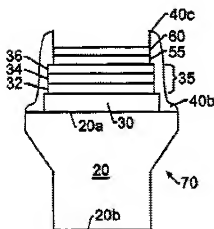


FIG. 8.

With regard to claim 2, Slater 721 discloses a Gallium Nitride device wherein the p-type ohmic electrode layer further comprises at least one bonding metal layer (fig 8,],paragraph [0098]).

With regard to claim 3, Slater 721 discloses a Gallium Nitride device (fig 7 combined layer 55+60, fig 8 combined layer 55+60)), wherein the p-type ohmic electrode layer is formed by sequentially laminating the contact metal layer (fig 8,fig 7 layer 32,) the reflective metal layer,(fig 8,fig 7 layer 34) the diffusion barrier layer (fig 8 ,fig 7 layer 36) , and the bonding metal layer fig 8 combined layer 55+60,fig 7 combined layer 55+60)

With regard to claim 4, Slater 721 discloses a Gallium Nitride device wherein the contact metal layer comprises at least one of Ni, Ir, Pt, Pd, Au, Ti, Ru, W, Ta, V, Co, Os, Re, and Rh. (fig 7,fig 8 , paragraph [0041].

With regard to claim 5, Slater 721 discloses a Gallium Nitride device wherein the reflective metal layer comprises at least one of Al and Ag (fig 8 , fig 7 layer 34 , paragraph [0041]note that Slater 721 discloses that layer 34 can be made of Aluminum or silver..

With regard to claim 6, Slater 721 discloses a Gallium Nitride device wherein the diffusion barrier layer comprises at least one of Ru, Ir, Re, Rh, Os, V, Ta, W, ITO (Indium Tin Oxide), IZO (Indium Zinc oxide), RuO₂, VO₂, MgO, IrO₂, ReO₂, RhO₂, OsO₂, Ta₂O₃, and WO₂ (paragraph [0042]). Note Slater 721 discloses the use of tungsten (W) as barrier layer (paragraph [0042]).

With regard to claim 7, Slater 721 discloses the invention of a gallium nitride device wherein the bonding metal layer comprises first and second bonding metal layers, said first bonding metal layer (,fig 8 , layer 55, fig 7 layer 62 or 55) comprising at least one of Ni, Cr, Ti,

Pd, Ru, Ir, Rh, Re, Os, V, and Ta, said second bonding metal layer (fig 8 layer 60, fig 7 layer 62 or 64) comprising at least one of Au, Pd, and Pt. (paragraph [0049],[0058],[0059])

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki et al.(US patent Application publication 2002/0014630) thereafter Okazaki 630 in view of Shibata et al (US patent Application Publication (US 2003/0991170 A1) thereafter Shibata 170.

With regard to claim 7, as set forth in the rejection of claim 2 or 3, Okazaki 630 discloses all the invention except for the limitation wherein the bonding metal layer comprises first and second bonding metal layers, said first bonding metal layer comprising at least one of Ni, Cr, Ti, Pd, Ru, Ir, Rh, Re, Os, V, and Ta, said second bonding metal layer comprising at least one of Au, Pd, and Pt. Shibata 170 however discloses the invention of a gallium nitride device wherein the bonding metal layer comprises first and second bonding metal layers, said first bonding metal layer (fig 4 layer 121) comprising at least one of Ni, Cr, Ti, Pd, Ru, Ir, Rh, Re, Os, V, and Ta, said second bonding metal layer (fig 4 combined layer 122+123) comprising at least one of Au, Pd, and Pt. ((Shibata 170 discloses Vanadium metal bonding layer 121 ,fig 4 paragraph [0100] metal bonding Au layer 122, fig 4 paragraph [0100])

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate this feature, as taught by Shibata 170 into the device disclosed by Okazaki 630 and come up with the invention of claim 7.

The rationale is as the following: a person skilled in the art at the time the invention would have been motivated to have more option of a multi-layered bonding electrode , taught by Shibata 170 to improve the Okazaki 630 in order to make it more responsive to different design demand of the competitive marketplace and make it a commercial success.

10. Claim 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki et al.(US patent Application publication 2002/0014630) thereafter Okazaki 630 in view Jang et al (US patent 6,326,294) thereafter Jang 294.

With regard to claim 14, as set forth in the rejection of claim 13 ,Okazaki 630 discloses all the invention including a first and a second contact layer (layer 32,33 fig 8) except for the limitation wherein the contact metal layer have a third layer. Jang 294, however, discloses a contact layer that can be multiple layers that can have a third layer (column 2 lines 53-60, column 4 lines 30-35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate this feature, as taught by Jang 294 into the device disclosed by Okazaki 630 and come up with the invention of claim 14.

The rationale is as the following:

A person skilled in the art would have been motivated to take all the advantage such as superior electrical and optical characteristics (taught by Jang 294 in the abstract, column 8 lines

23-31) in order to make The Okazaki 630 device a commercial success. More over a person skilled in the art at the time the invention was made would have been motivated to use the multilayer contact layer disclosed by Jang 294, to tailor the Okazaki 630 device to get more options in response to diverse demand by the customer that required different specification of the important contact layers of the Nitride device

With regard to claim 15, 16 as set forth in the rejection of claim 14, the combined Okazaki 630 in view of Jang 294 discloses all the invention except for the specific thicknesses of different layers. These limitations, however, are considered obvious for the following rationale: The selection of parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.,** would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, etc., or in combination of the parameters** would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson*

56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Slater Jr et al. (US patent Application publication 2003/0015721) thereafter Slater 721 in view Jang et al (US patent 6,326,294) thereafter Jang 294.

With regard to claim 17, as set forth in the rejection of claim 1, Slater 721 discloses all the invention except for the limitation wherein the contact metal layer has a multiple layer structure with a second layer and a third layer. Jang 294, however, discloses a contact layer that can be multiple layers that can have a second layer and a third layer (column 2 lines 53-60, column 4 lines 30-35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate this feature, as taught by Jang 294 into the device disclosed by Slater 721 and come up with the invention of claim 17.

The rationale is as the following:

A person skilled in the art would have been motivated to take all the advantage such as superior electrical and optical characteristics (taught by Jang 294 in the abstract, column 8 lines 23-31) in order to make The Slater 721 device a commercial success. More over a person skilled in the art at the time the invention was made would have been motivated to use the multilayer contact layer disclosed by Jang 294, to tailor the Slater 721 device to get more options

in response to diverse demand by the customer that required different specification of the important contact layers of the Nitride device

12. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and the page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

13. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to be abandoned (see M.P.E.P. 710.02(b)).

14. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d) which papers have been placed of record in the file.

CONCLUSION

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tinh T Nguyen whose telephone number is 571-272-1790. The examiner can normally be reached on 9:30 am - 6:30 pm Monday to Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEVEN LOKE can be reached on 571-272-1657. The fax phone numbers for the organization where this application or proceeding is assigned is 571-273-8300

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval [PAIR] system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**/Thinh T Nguyen/
Primary Examiner**

Art Unit 2818